

the veronica hybrida mule Speedwel is supposed to have originated from the officinal one; and the spiked one and the *Sibthorpia Europaea* to have for its parents the golden saxifrage and the marsh pennywort. . . . Mr. Graberg, Mr. Schreber, and Mr. Ramstrom, seem of the opinion, that the internal structure or parts of fructification in mule plants resemble the female parent; but that the habit or external structure resembles the male parent. . . . The mule produced from a horse and the ass resembles the horse externally with his ears, mane, and tail; but with the nature or manners of an ass: but the Hinnus [hinny], or creature produced from a male ass, and a mare, resembles the father externally in stature, ash-colour, and the black cross, but with the nature or manners of a horse."

JEAN BROADHURST

REVIEWS

Ganong's *The Living Plant**

This book is the second number in division III, Functions of Nature, of The American Nature Series, the first number being Beebe's "The Bird." It is the announced aim of the series as a whole to furnish "a series where the nature-lover can surely find a readable book of high authority"; and the books of the third division of the series "treat of the relation of facts to causes and effects—of heredity and the relations of organism to environment."

The author's experience as a teacher, and as an investigator and writer, admirably fitted him for the preparation of this work. It was not an easy task; not as easy as might at first be imagined, for while "botany" is, in a sense, a popular science, its popularity diminishes approximately as the square of the distance from the "how-to-know-the-wild-flowers" phase of it, from which the book under review is a wide departure.

The book is unique, being the only attempt (so far as known to the reviewer) to popularize the entire range of plant physiology.

* Ganong, William F. *The Living Plant. A Description and Interpretation of its Functions and Structure.* Pp. i-xii + 1-478. f. 1-178. New York, Henry Holt & Company, 1913. Price \$3.50 net.

Although not addressed to the author's colleagues (p. v) it will surely (and ought to) receive a share of their attention, and parts of it will call forth the protests of some of them, and the antagonism of others. For example, Darwinian adaptation is advocated (p. vi and throughout the text), and the corresponding language of purpose is used—"Experiential purpose, which does not presuppose any forethought." We are told (p. 334) that plants really do "reach up after light"; that the need of light for stems and the injuriousness of light to the unprotected protoplasm of roots is the "reason" (p. 227) for their characteristic phototropism; that parthenogenetic reproduction has been adopted by certain Compositae because it would be "natural" for them "to preserve their characteristics unchanged by resorting to asexual propagation."

But these forms of expression are perfectly logical for one who believes (p. 326) that it is "scientifically correct as well as practically convenient, to personify nature." From this the reviewer must emphatically dissent. He believes that nothing has been more potent in retarding the development and advancement of experimental inquiry in the past than the willingness to accept final causes with satisfaction as really explaining the phenomena of nature. This tendency is still strong, and to combat it at every point is one of the duties and opportunities of the writers of "popular" science.

The author is a vitalist in that he assumes "the existence in Nature of an X-entity, additional to matter and energy but of the same cosmic rank as they" (p. viii). The "most reasonable explanation of the phenomena of organic nature" is held to be "that all of the life processes are subordinate to some influence which is using living matter as a seat for its operations." All protoplasm thinks (p. 14). The reviewer is here an agnostic, but he believes that to ascertain the truth on this point is the most fundamental and important problem, indeed the ultimate goal of all biology. The mechanistic conception of life is fraught with too serious a meaning for human beings to be accepted without a challenge at every possible point and place. It is well, therefore, to have a vitalistic point of view clearly set forth, and

probably a popular treatise is not the place to argue the question in detail, yet the other side, as an alternative possible conception, ought to be clearly stated. The author's advice (p. 15) to the reader to read this chapter last, or to re-read it after he has finished the rest of the book, is a wise one.

The reviewer has dwelt, perhaps over long, on these philosophical aspects of the book, because he personally feels that the real importance and value, as well as the real weaknesses, of popular science lie in what it does for the lay mind in just this connection. It is more important to be intelligently and (so far as possible) correctly informed with reference to these larger and fundamental problems than merely to know the wild flowers, or to understand the "facts" of physiology and ecology. Correctly to orient the reader on such questions is one of the most important services that "popular" science can render.

The book is well knit together, admirably illustrated with cuts, mostly either new or original with the author, and where the reviewer feels that the interest of the lay reader might possibly lag, he feels that the reason is to be found in the nature of the materials with which the author is dealing, rather than with the method of treatment. In fact, the reviewer believes that the first 223, out of a total of 445 pages, are devoted to those phases of plant life that are of least popular interest. It was almost humiliating to be forced to the conviction that respiration, photosynthesis, transpiration, etc., are not of great popular interest. The reviewer would like to think otherwise, and once did, but experience with classes has forced him to a change of view.

The author himself seemed aware (cf. pp. 37, 73, 97, and 194) that the chapters were, in general, too long, and in many instances they could have been divided naturally and to great advantage.

In light of the general high excellence of the book as a whole, it seems almost puerile to call attention to the fact that "cells" are defined (p. 20) as "always compartments of some sort"; that radium "emanations" (there is only one radium emanation) are referred to (p. 251); that capillarity is defined (p. 179) as a force; that chromosomes are said to "embody within themselves

the characteristics of the parent plant"; that (in the light of recent work by Pond and others) solution is given (p. 359) as one of the ways by which branch roots make their way through the cortex; that Plateau's experiments (of really popular aspect) are ignored in discussing the significance of flower color in pollination by insects; and that the statolith hypothesis is treated (p. 248) as a generally accepted, correct explanation of geotropism.

Natural selection is still held (p. 409) to explain "very perfectly" the *origin* of new species; in fact, in the light of the *Die Mutationstheorie*, and all the work that has followed from it, this statement and the first half of page 411 read almost like anachronisms.

To list the good points of the book not previously mentioned would require more space than has already been occupied. The endeavor on the part of professional scientific men to popularize their work; to prepare for the layman a readable account of the present status of their science, equally free from unnecessary technicalities, and from statements exaggerated, distorted, or otherwise misleading in the attempt to simplify, and to invest the subject with interest which it is supposed otherwise to lack, is a labor very much worth while, and too frequently left to tyros. One conspicuous value of the book under review is that it acquaints the reader, not only with the results of botanical study, but also with the methods of thought and work by which such knowledge is ascertained. It is unfortunate that the book is much too heavy to be held comfortably in the hands while reading.

C. STUART GAGER

NEWS ITEMS

During Dr. D. T. MacDougal's trip through the Sudan and the Egyptian Desert in January and February, 1912, a considerable collection of herbarium specimens was made and later submitted to Dr. A. B. Rendle and other members of the staff of the department of botany of the British Museum of Natural History. The collection is enumerated by Dr. Rendle in the